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AIR PREHEATER

Filed April 30, 1956

FIG. 1.

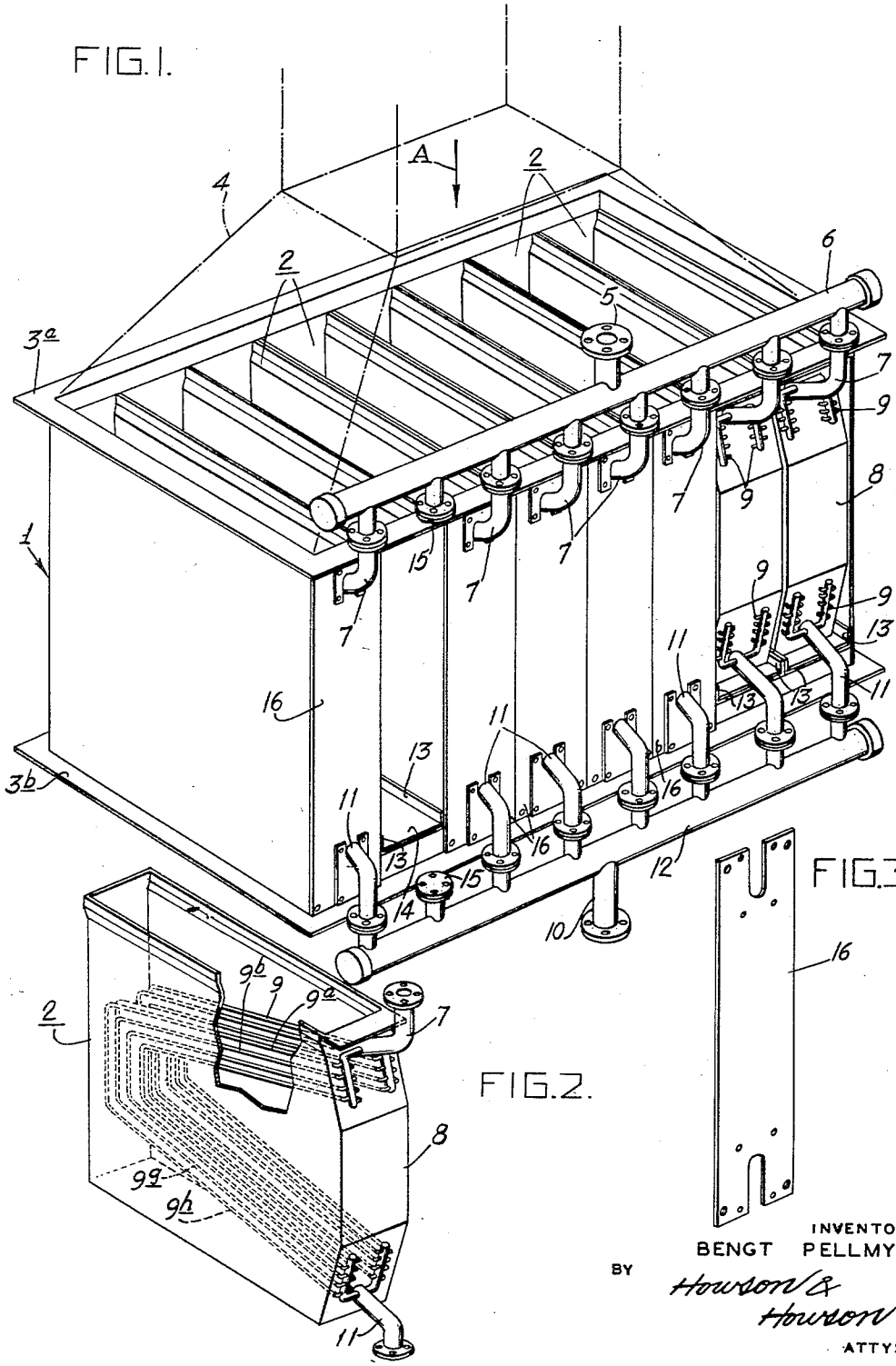


FIG. 2.

FIG. 3.

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AIR PREHEATER

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2 Claims. (Cl. 257—230)

The present invention relates to an air preheater, preferably intended for steamship boilers, designed for vertical air flow and consisting of a number of parallel-connected battery sections placed side by side and enclosed in a common casing with open, flanged upper and lower sides.

In order to interrupt the operation as little as possible, when defects occur, it is of the greatest importance, as far as air preheating systems in general are concerned, to be able to change defective tubes or groups of tubes without dismounting more structure than is absolutely necessary. This applies to a much higher degree to preheaters for steamship boilers, and as the available space is limited as far as such boilers are concerned, the length of the tubes should be limited. For steamship plants it is finally of great importance—if the necessary number of spare elements is not available—that the preheater can be used temporarily, with slightly reduced capacity, even if a great portion of the heating surface has been disconnected. The object of the present invention is to eliminate the drawbacks of earlier known air preheaters, which drawbacks are due to the fact that the above-mentioned viewpoints have not been duly considered as far as the design of the preheater is concerned.

The invention is mainly characterized in that each battery section consists of a number of parallel-connected tubes enclosed in a separate channel-like box, which tubes, in the form of V-shaped, vertically arranged coils extend across the channel and are connected at one of the side walls of the channel to common inlet and outlet head pipes; the casing of the preheater furthermore being made without a wall plate at one side and provided with transverse guide irons adjacent the bottom flange for supporting the battery sections, which sections are to be inserted through the open side of the casing and which in the casing form a number of vertical, parallel channels for the flow of air to be preheated, the sides of the said battery sections, located adjacent said head pipes, cooperate to close the open side of the casing of the preheater.

A preferred embodiment of the invention with a plurality of rows of tubes mounted in sequence in the direction of the air flow is characterized in that the generally V-shaped coils are formed of tubes of the first and the last row, respectively the second and the next to last row, et cetera. Thereby an advantageous equalization of the heating load on the rows of tubes is obtained.

The invention will now be described more in detail, with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of a preheater made in accordance with the present invention, one battery section being removed, and cover plates for two others being removed;

Fig. 2 is a perspective view of a battery section detached from the preheater, a portion being broken away to more clearly illustrate the construction thereof; and,

Fig. 3 is a detached perspective view of one cover or front plate of the preheater.

Referring now to the drawing reference numeral **1** designates the casing of the air preheater, which casing encloses a number of parallel-connected battery sections **2** placed side by side. The casing at its open upper and lower ends is provided with connecting flanges **3***a* and **3***b* respectively. Flange **3***b* is to be connected to the fresh air intake of the boiler and flange **3***a* is to be connected to a hood **4** which in turn is to be connected to a fresh-air fan (not shown in the drawing). Thus, the air passes the preheater in the direction indicated by the arrow A. Each battery section consists of a number of parallel-connected tubes **9** enclosed in a separate channel-like box **8**, which tubes extend across the channel in its longitudinal direction in the form of generally V-shaped, vertically arranged coils. At one of the sides of the channel the coils are connected to common inlet and outlet head pipes **7** and **11** respectively. The inlet head pipes are connected to a distributing pipe **6** provided with a steam inlet **5**. In the same way the outlet head pipes are connected to a collecting tube **12** provided with an outlet **10** for condensate. When—as in the illustrated embodiment— the air preheater is provided with a plurality of rows of tubes in sequence in the direction of flow of the air, the generally V-shaped coils **9** are preferably made in such a manner that the first tube **9***a* and the last tube **9***h* form one unit, the tubes **9***b* and **9***g* forming the next unit et cetera, in order to equalize the load of the coils. The battery sections rest on transverse guide irons **13** fixed to the bottom flange of the casing of the preheater. By disconnecting the inlet and outlet head pipes and the front plate **16** of a battery section said section can easily be taken out of the casing. If the necessary spare section to replace a damaged section is not available, the preheater can still be used. In the space of a removed damaged section a covering plate **14** is placed on said guide irons **13**, which plate shuts off the flow of air of this section, and the connecting tubes are provided with blind flanges **15**. Owing to the reduced area of the air flow the speed of the flow increases and thus also the heat transmission coefficient, so that the total effect of the preheater is but slightly reduced, despite the fact that a section has been taken out.

What I claim is:

1. An air preheater for steamship boilers and the like comprising a generally rectangular casing open at its upper and lower ends, flange means for connecting said open ends respectively to means for admitting fresh air to said preheater and discharging heated air from said preheater, one side of said casing being open, a plurality of spaced parallel transverse guide irons in said casing adjacent the lower end thereof defining therebetween a given number of horizontally aligned contiguous parallel passages for the vertical flow of air through said casing, and a like number of removable battery sections individually supported on said guide irons in side-by-side relation, each battery section comprising a separate vertical open-ended channel-like box forming a vertical channel in registry with the associated passage for the flow of air therethrough, and heater means in each battery section comprising a plurality of heating tubes extending across said passage, and common inlet and outlet head pipes for heating medium connected to the opposite ends of said tubes, said head pipes being mounted on one wall of said battery section, said one wall of each battery section being operable to close a portion of said open side of the casing, whereby a full complement of battery sections effects closure of said open side, supply means for heating medium connecting the head pipes of said battery sections for parallel flow of heating medium therethrough and means

to block one of said passages between said guide irons upon removal of the associated battery sections whereby the air normally flowing through said battery sections is diverted through the vertical channels of the remaining battery sections.

2. An air preheater according to claim 1 wherein said tubes in each battery section are generally V-shaped coils and are arranged vertically in said channel, the legs of said generally V-shaped tubes being in vertically aligned sequence, the coils being nested whereby the first and last legs in the sequence constitute one V-shaped coil, the second and next-to-last legs in the sequence constitute another coil, etc., to thereby equalize the heating load on the tubes by the air passing over said tubes.

References Cited in the file of this patent

UNITED STATES PATENTS

1,744,452	Dowd	Jan. 21, 1930
1,787,444	French	Jan. 6, 1931
1,810,165	Frank et al.	June 16, 1931
1,835,046	Hickey et al.	Dec. 8, 1931
2,409,801	Ruegg	Oct. 22, 1946
2,615,687	Simmons	Oct. 28, 1952
2,655,138	Falla	Oct. 13, 1953
2,729,433	Berg	Jan. 3, 1956

FOREIGN PATENTS

472,822	Great Britain	Sept. 27, 1937